

Rapid Watershed Assessment Eastern Estancia Watershed



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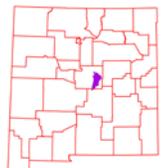


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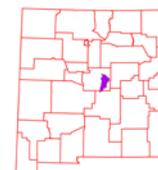
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Overview

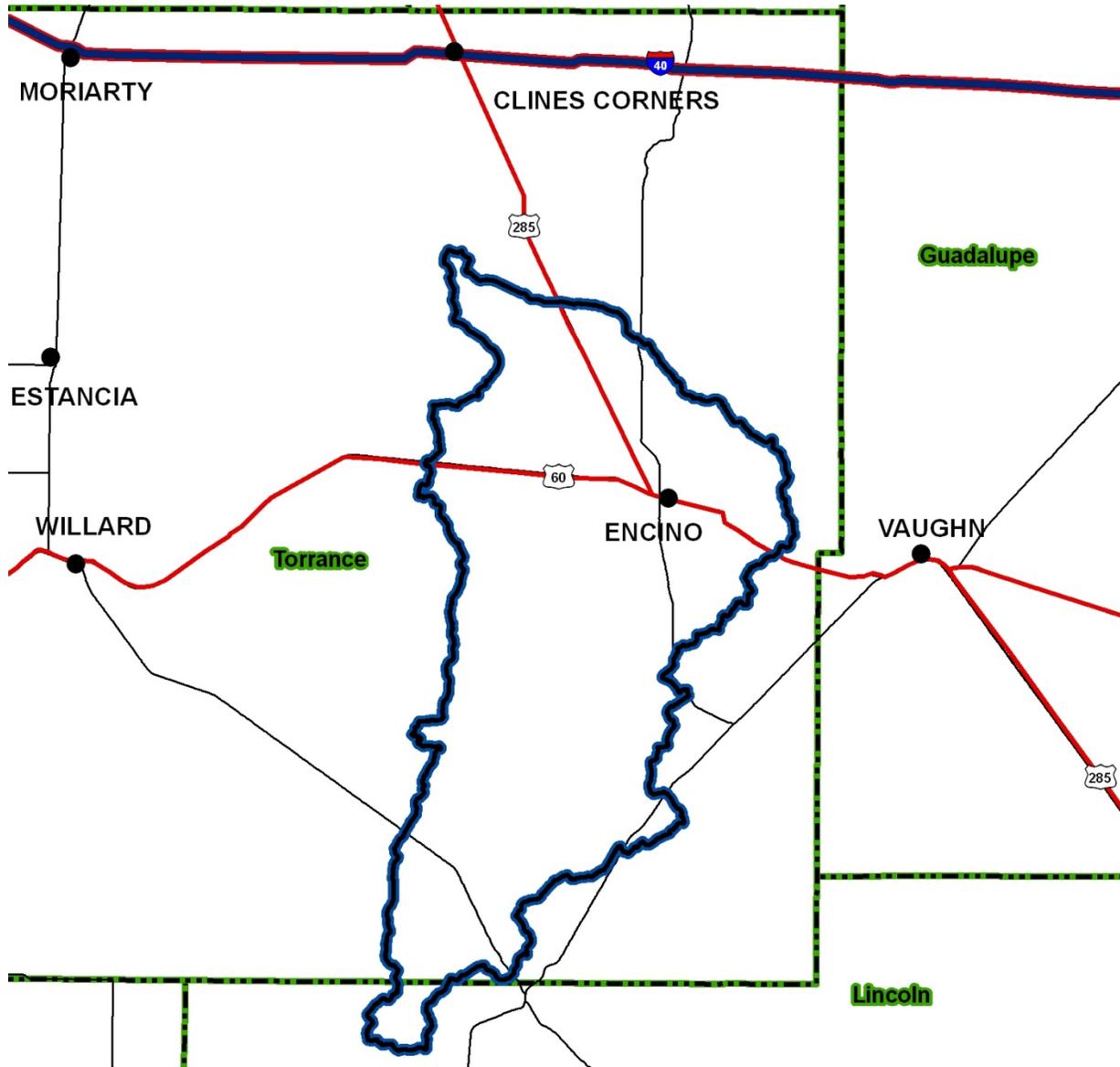
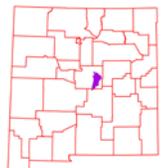


Figure 1. Eastern Estancia Watershed Overview



Overview

The Eastern Estancia Watershed is located in east central New Mexico. It covers 329,176 total acres (2,690 sq. km). Portions of the Eastern Estancia watershed extend into Lincoln and Torrance counties. Table 1 summarizes the distribution of the Eastern Estancia watershed.

| | County Acres Total | Acres in HUC | % of HUC in County | % of County in HUC |
|----------------------------------|--------------------|----------------|--------------------|--------------------|
| Lincoln | 3,089,795 | 6,896 | 2 | <1 |
| Torrance | 2,139,990 | 322,280 | 98 | 15 |
| Sum (Σ) | -- | 329,176 | 100 | -- |

Table 1. Eastern Estancia watershed acreage distribution.

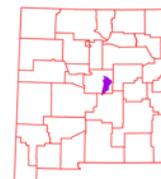
Physical Setting

Geology:

This hydrologic unit is located in the ancient pluvial lake depression of Lake Estancia (now the Estancia Basin) in the Basin and Range physiographic. The western boundary passes close to Cedarville, Eshelman Road east of Culebra and the Perdernal Hills. The northern edge of the hydrologic unit is bounded by Perdernal Hills, Lobo Hill, and just east of Canero. The eastern edge roughly follows State Highway 54 from Duran to Corona and terminates at Rough Mountain.

Surrounding most of the Eastern Estancia Basin are Permian Period sandstones, siltstones, anhydrite, gypsum, halite and dolomite. The Estancia Basin is internally drained and contains eolian, lacustrine and playa deposits. Salt was mined in historic times from the playas. Resource concerns include wind erosion.

Groundwater quality and quantity is a concern. Depth to groundwater is a concern if the shallow unconfined aquifer does not produce enough water for the resource or increased population demands are 'mining' the water. Groundwater in the limestones is usually along fracture zones which are hard to intercept with water wells. Groundwater quality ranges from good to poor for livestock or crops.



Soils:

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. The soils in the Eastern Estancia watershed are assigned to four groups (A, B, C, and D).



Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.



Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.



Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.



Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.



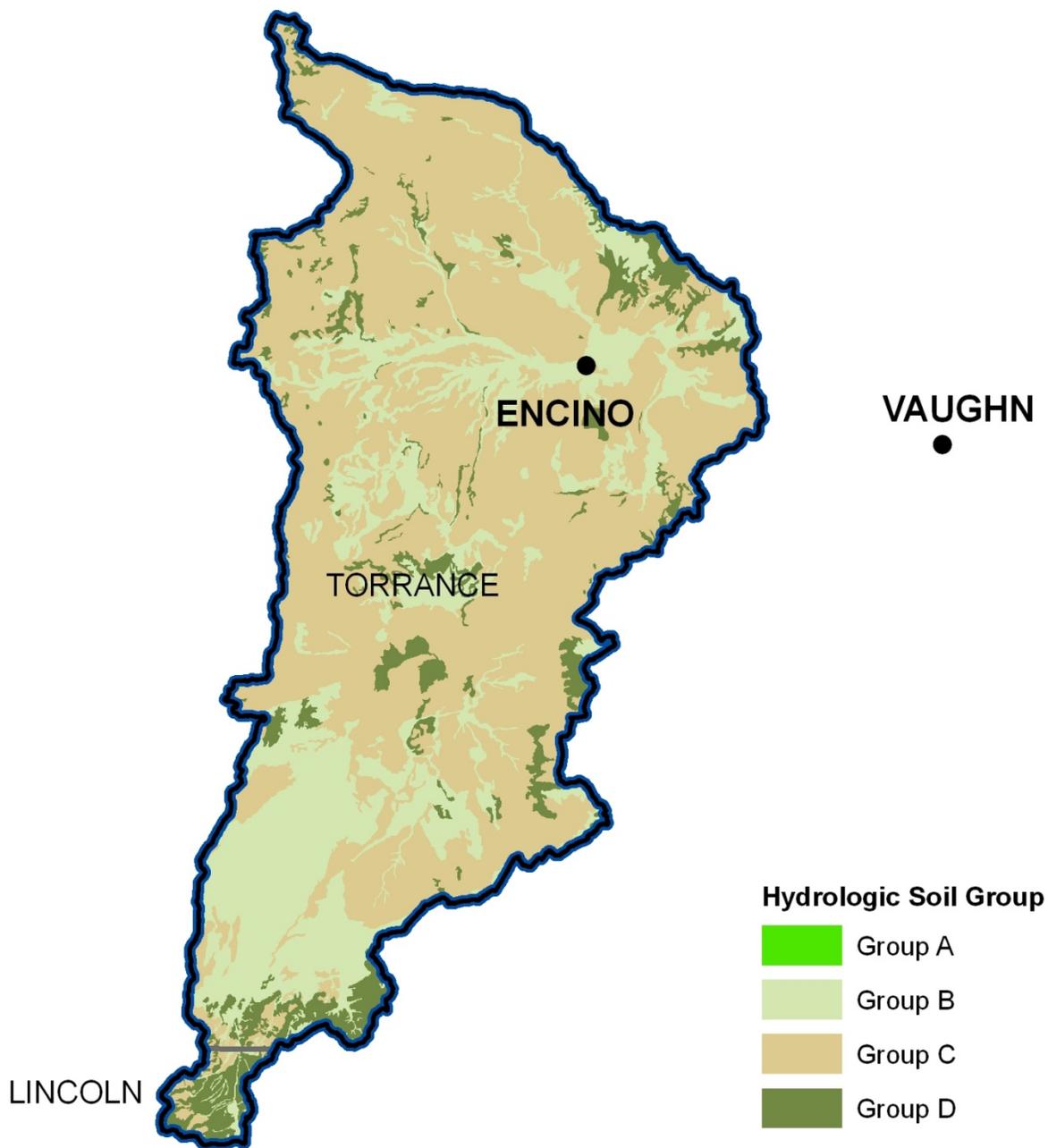


Figure 2. Hydrologic Soil Group

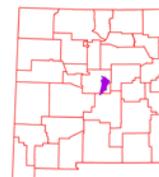
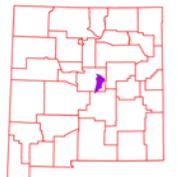




Figure 3. Eastern Estancia Watershed Shaded Relief



Precipitation ¹

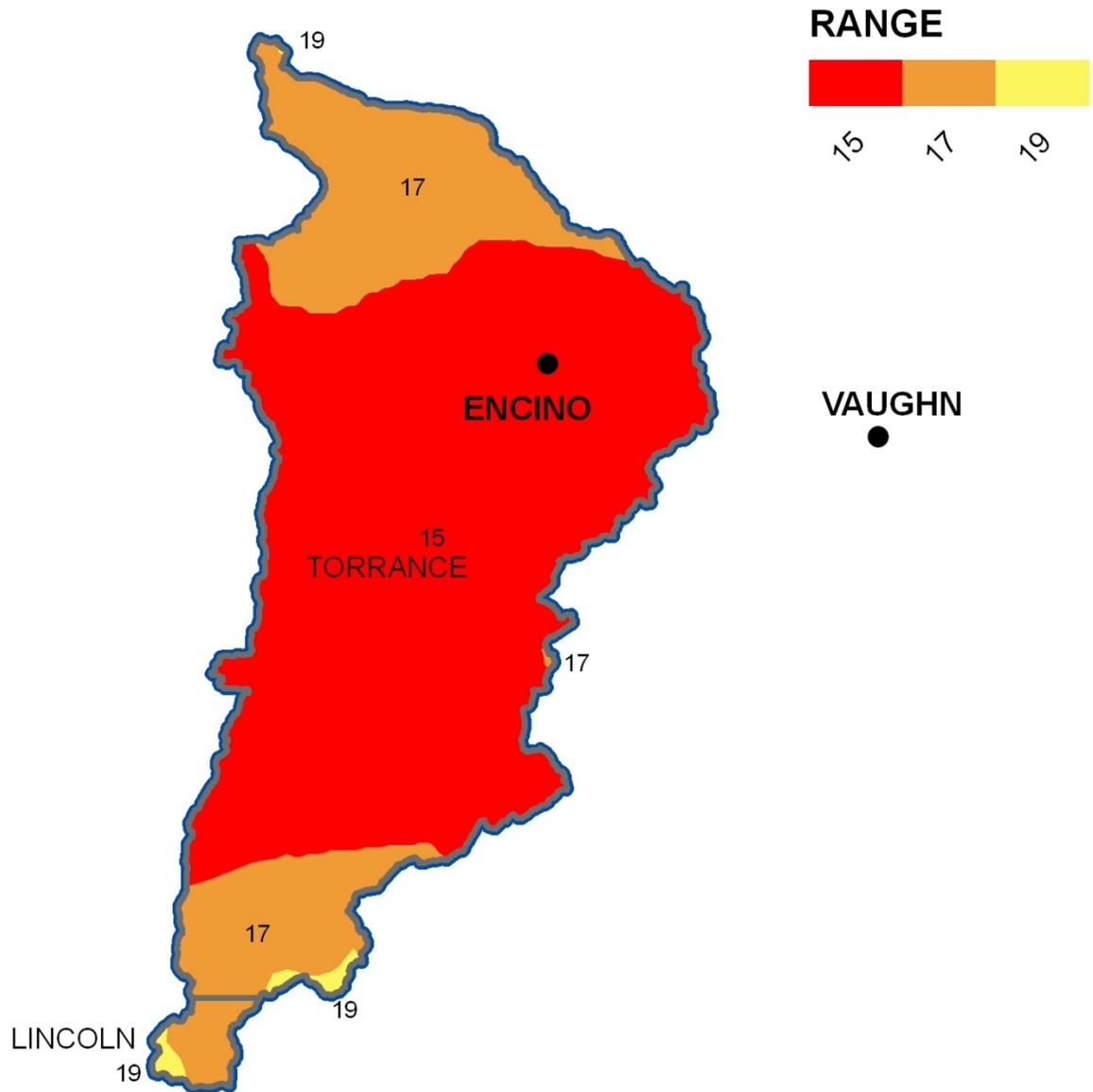
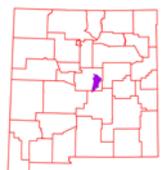


Figure 4. Eastern Estancia Watershed Annual Precipitation.



Land Ownership ²

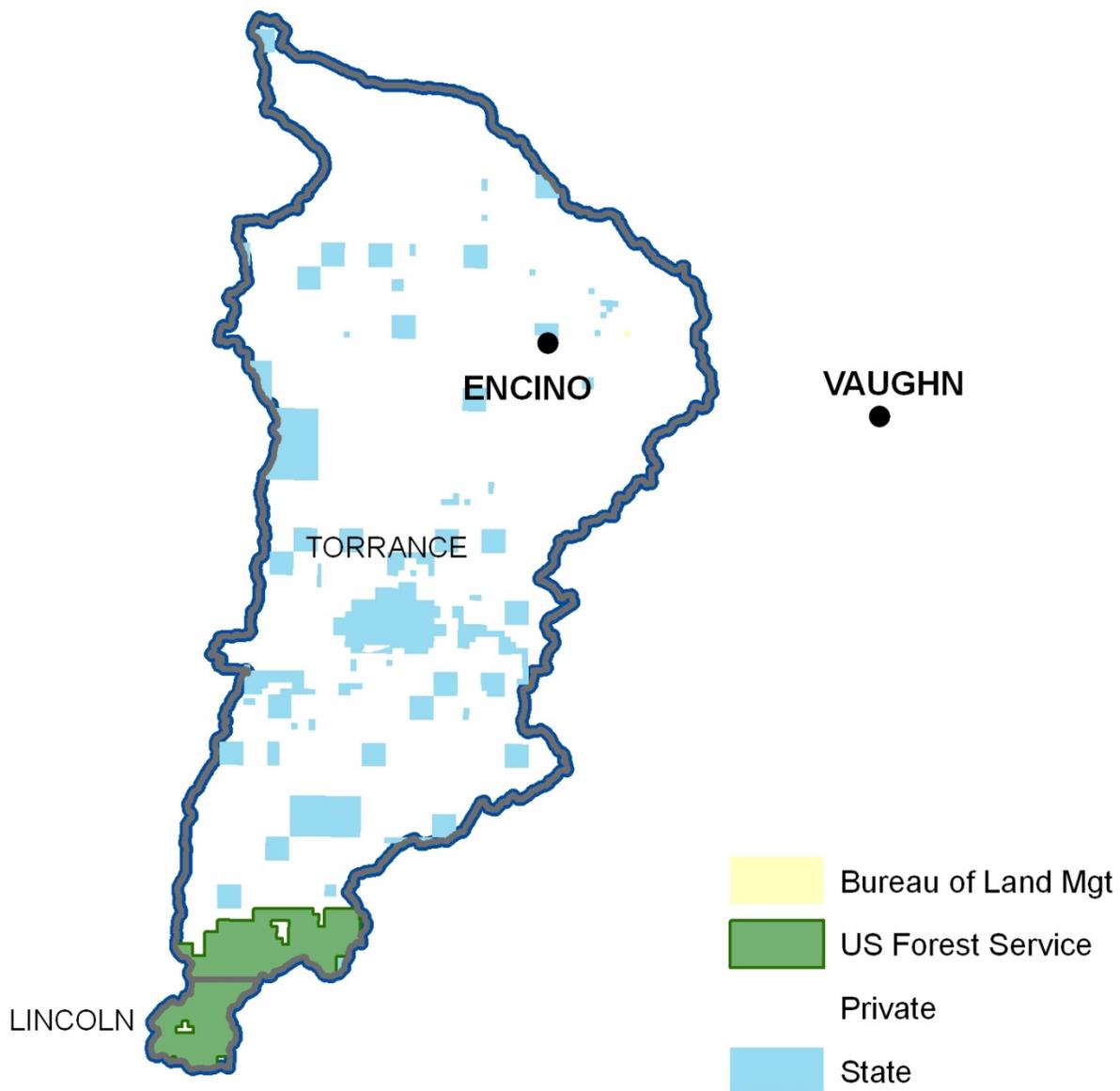
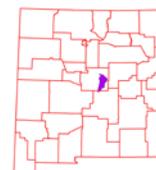


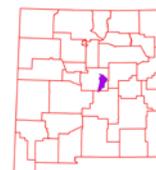
Figure 5. Eastern Estancia Watershed Land Ownership.



Land Ownership

| <u>COUNTY</u> | <u>BLM</u> | <u>FS</u> | <u>Private</u> | <u>State</u> |
|--------------------------|--------------|---------------|----------------|---------------|
| Lincoln | | 6,595 | 301 | |
| Torrance | 41 | 10,127 | 275,554 | 36,396 |
| Watershed (Σ) | 41 | 16,722 | 275,855 | 36,396 |
| % Watershed | <1 | 5 | 84 | 11 |

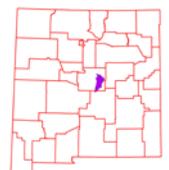
Table 2. Land ownership in the Eastern Estancia watershed.



Land Use / Land Cover ^{3, 4}



Figure 6: Subset of the National Land Cover Dataset over the Eastern Estancia Watershed.

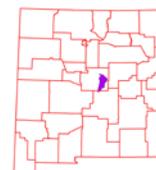


Land Use / Land Cover

The U.S. Geological Survey (USGS) produced the National Land Cover Dataset (NLCD) as part of a cooperative project between the USGS and the U.S. Environmental Protection Agency (USEPA). The goal of this project was to produce a consistent land cover data layer for the conterminous United States. The Multi Resolution Land Characterization (MRLC) Consortium collected the data used to compile the NLCD. The MRLC Consortium is a partnership of Federal agencies that produce or use land cover data; partners include the UNITED STATES GEOLOGICAL SURVEY (National Mapping, Biological Resources, and Water Resources Divisions), USEPA, the U.S. Forest Service, and the National Oceanic and Atmospheric Administration.

| <u>Land use / Land cover</u> | <u>Acres</u> | <u>% of Watershed</u> |
|--------------------------------------|--------------|-----------------------|
| Grasslands, Herbaceous | 287,188 | 87 |
| Shrubland | 26,708 | 8 |
| Evergreen Forest | 10,478 | 3 |
| Low Intensity Residential | 2,249 | 1 |
| Emergent Herbaceous Wetlands | 1,116 | < 1 |
| Open Water | 562 | < 1 |
| Bare Rock/Sand/Clay | 539 | < 1 |
| High Intensity Residential | 150 | < 1 |
| Row crops | 124 | < 1 |
| Commercial/Industrial/Transportation | 52 | < 1 |

Table 3. Extent of NLCD classes in the Eastern Estancia watershed.



Land Use / Land Cover

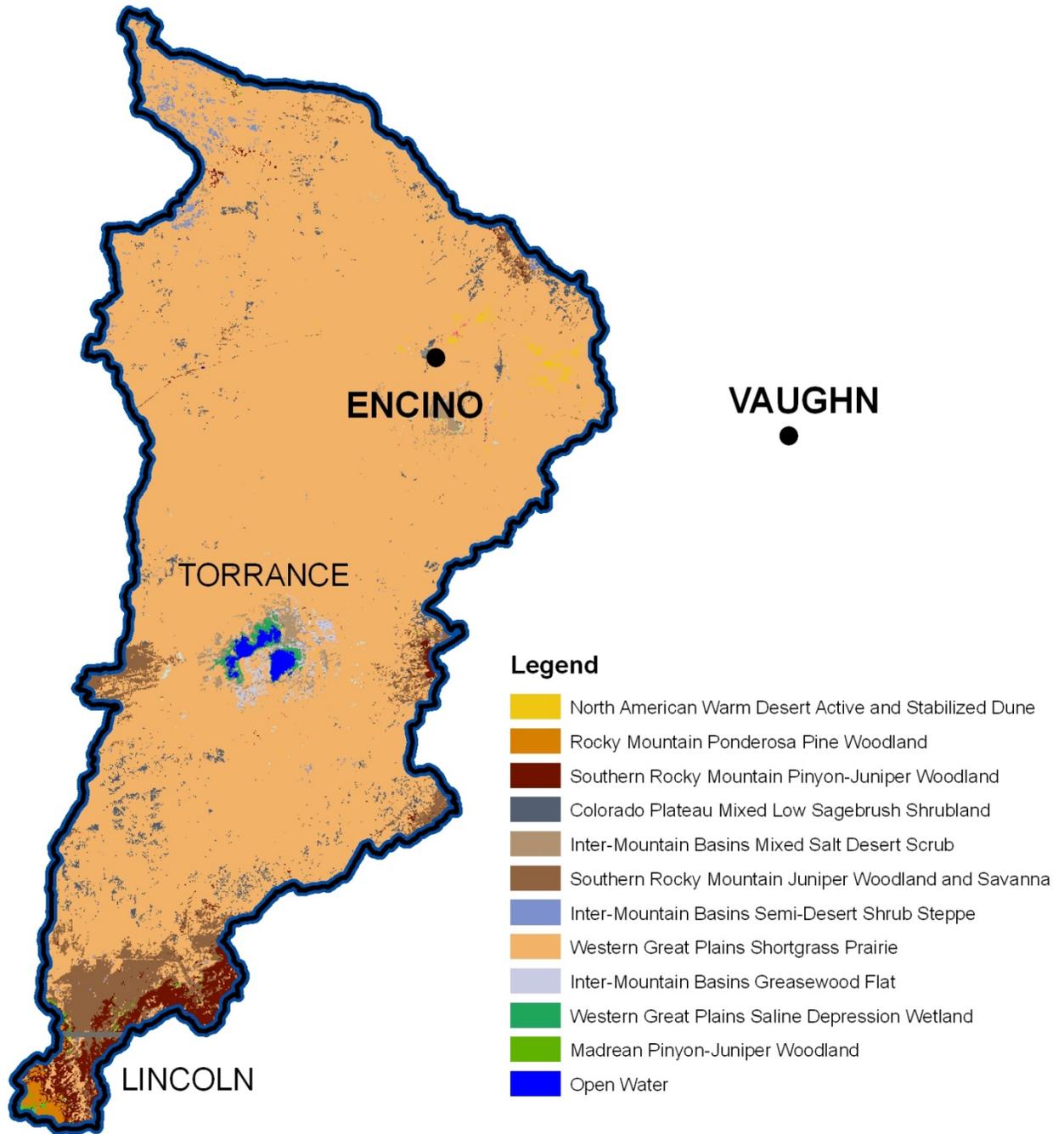


Figure 7. Subset of the SWREGAP over the Eastern Estancia Watershed. The 12 dominant ecosystems are displayed in the legend.

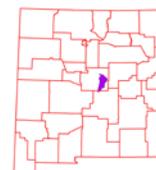


Land Use / Land Cover

The landcover mapping effort for the Southwest Region Gap Analysis Project was a coordinated multi-institution endeavor. This dataset was created for regional terrestrial biodiversity assessment. Additional objectives were to establish a coordinated mapping approach to create detailed, seamless maps of land cover, all native terrestrial vertebrate species, land stewardship, and management status, and to analyze this information to identify those biotic elements that are underrepresented on lands managed for their long term conservation.

| <u>Ecosystem</u> | <u>Acres</u> | <u>% of Watershed</u> |
|---|--------------|-----------------------|
| Western Great Plains Shortgrass Prairie | 287,870 | 87 |
| Southern Rocky Mountain Juniper Woodland and Savanna | 15,991 | 5 |
| Southern Rocky Mountain Pinyon-Juniper Woodland | 8,433 | 3 |
| Colorado Plateau Mixed Low Sagebrush Shrubland | 5,715 | 2 |
| Inter-Mountain Basins Mixed Salt Desert Scrub | 3,468 | 1 |
| Inter-Mountain Basins Semi-Desert Shrub Steppe | 1,924 | 1 |
| Rocky Mountain Ponderosa Pine Woodland | 1,812 | 1 |
| Inter-Mountain Basins Greasewood Flat | 1,537 | < 1 |
| Open Water | 1,306 | < 1 |
| Western Great Plains Saline Depression Wetland | 998 | < 1 |
| North American Warm Desert Active and Stabilized Dune | 785 | < 1 |
| Madrean Pinyon-Juniper Woodland | 300 | < 1 |

Table 4. SW Region Gap analysis ecosystem acreages.



Hydrology 5, 6, 7, 8, 9

The National Hydrography Dataset (NHD) is a comprehensive set of data that encodes information about naturally occurring and constructed bodies of water, paths through which water flows, and related entities. The NHD identifies 657 miles (1,041 km) of water courses in the Eastern Estancia River Watershed. The majority of these courses typically flow intermittently in summer months during periods associated with high intensity convective thunderstorms.



Figure 8. National Hydrologic Dataset (NHD) of the Eastern Estancia.



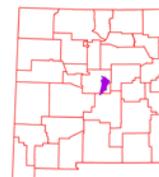
| Water Course Type | Miles |
|-----------------------------|-------|
| Artificial path | 15 |
| Canal / Ditch | 1 |
| Intermittent Stream / River | 641 |
| Sum (Σ) | 657 |

Table 5. NHD Water Course Type and Extents

There are no dams or water gauging stations in the watershed.

The New Mexico Water Quality Control Commission (NMWQCC) is the issuing agency of water quality standards for interstate and intrastate waters in New Mexico. The NMWQCC has defined the Eastern Estancia watershed as part of the Rio Grande River Basin.

Within the Eastern Estancia Watershed, there are no bodies of water or stream reaches that are listed as impaired as of the 2010-12 listing cycle.



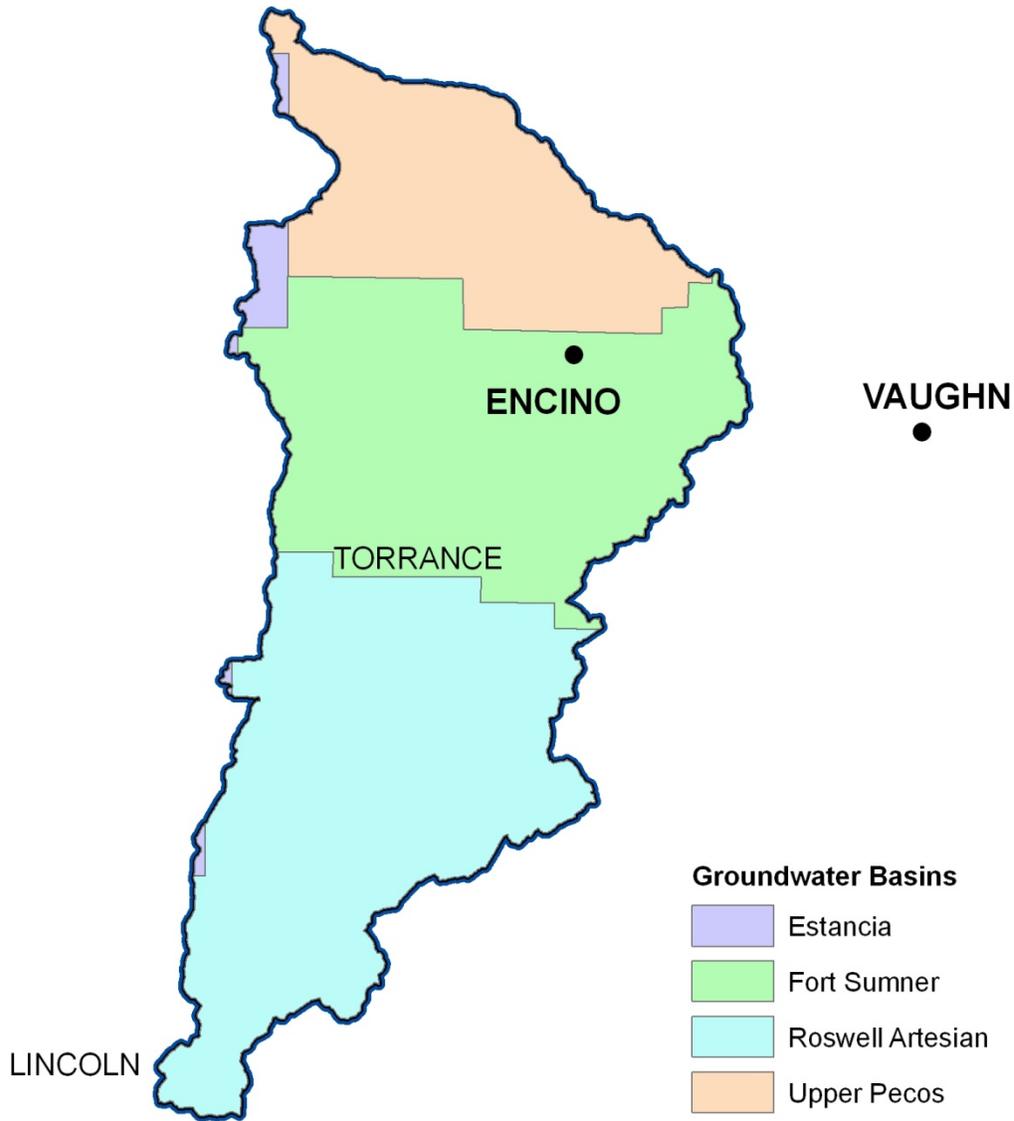
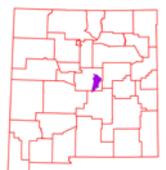


Figure 9. Declared Groundwater Basins of the Eastern Estancia.

A declared groundwater basin is an area of the state proclaimed by the State Engineer to be underlain by a groundwater source having reasonably ascertainable boundaries. By such proclamation the State Engineer assumes jurisdiction over the appropriation and use of groundwater from the source. The Eastern Estancia watershed is within the Estancia, Fort Sumner, Roswell Artesian, and Upper Pecos Underground Water Basins.



Threatened and Endangered Species ¹⁰

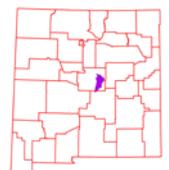
Endangered species are those that are at risk of extinction throughout all or a significant portion of its native range. A threatened species is one that is likely to become endangered in the foreseeable future. The New Mexico Natural Heritage program tracks the status of threatened and endangered species which are listed on both federal and state lists. There are no species currently listed and tracked in the Eastern Estancia River Watershed.

Invasive Species ¹¹

Invasive species are those which have been introduced into a region or ecosystem and have the ability to out-compete native species for resources (i.e. water, nutrients, sunlight, etc.) The Southwest Exotic Plant Mapping Program (SWEMP) is a collaborative effort between the United States Geological Survey and federal, tribal, state, county and non-government organization partners in the southwest which maintains ongoing efforts to compile and distribute regional data on the occurrence of non-native invasive plants in the southwestern United States. Within the Eastern Estancia watershed, the SWEMP has identified 7 species of invasive plants (Table 9). Each of these species is defined as non-native by the USDA PLANTS database.

| <u>Scientific Name</u> | <u>Common Name</u> |
|---|---|
| <i>Scrophylariaceae</i> (Figwort Family) | Dalmatian Toadflax |
| <i>Brassicaceae</i> (Mustard Family) | Hoary Cress (Whitetop) |
| <i>Asteraceae</i> (Sunflower Family) | Musk Thistle |
| <i>Brassicaceae</i> (Mustard Family) | Perennial Pepperweed (Tall Whitetop) |
| <i>Asteraceae</i> (Sunflower Family) | Russian Knapweed |

Table 6: Invasive Species Recognized by the SWEMP.



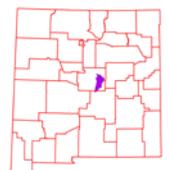
Common Resource Areas ¹²

A Common Resource Area (CRA) is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) designation. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area.

Each Common Resource Area will have multiple Conservation System Guides associated with it. A Conservation System Guide associates, for a given CRA and land use, different components of Resource Management Systems and their individual effect on conserving soil and water resources..



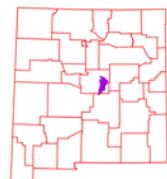
Figure 10. Common Resource Areas of the Eastern Estancia



Common Resource Areas

35.1 – Central New Mexico Highlands

Tablelands and mesas separated by broad plains and small terraces characterize this area. Elevation is 5,000 to 7,200 feet and precipitation is 12 to 17 inches. The soil moisture regime is aridic to ustic and the soil temperature regime is mesic. Pinyon-juniper savannah and pinyon juniper woodlands at higher elevations, and broad mid- to short-grass prairies and basins at lower elevations dominate the area. Current land use is livestock grazing. The soils formed in Quaternary alluvium, eolian sands, and sedimentary rocks of Permian age. (Old CP-3)



Conservation ¹³

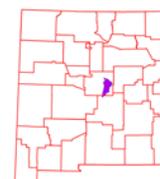
The USDA-Natural Resources Conservation Service (NRCS) focuses on the development and delivery of high quality products and services that enable people to be good stewards of our Nation's soil, water, and related natural related resources on non-Federal lands. The Natural Resources Conservation Service's conservation programs aid agricultural producers in their efforts to reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. Public benefits include enhanced natural resources that help sustain agricultural productivity and environmental quality while supporting continued economic development, recreation, and scenic beauty.

| Conservation Practice | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | TOTAL | |
|------------------------------------|----------|------------|----------|------------|----------|------------|-----------|---------------|-----------|--------------|-----------|---------------|
| | # | Acres | # | Acres | # | Acres | # | Acres | # | Acres | # | Acres |
| Brush Management | 2 | 138 | 3 | 375 | 6 | 422 | | | 1 | 68 | 12 | 1,003 |
| Prescribed Grazing | | | | | 1 | 281 | 10 | 15,198 | 6 | 4,422 | 17 | 19,901 |
| Upland Wildlife Habitat Management | | | | | 1 | 281 | 9 | 13,304 | 6 | 4,422 | 16 | 18,007 |
| SUM (Σ) | 2 | 138 | 3 | 375 | 8 | 984 | 19 | 28,502 | 13 | 8,912 | 45 | 38,911 |

Table 7. 5 year Trends in Applied Conservation Practices. Reported in Acres.

| Conservation Practice | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | | TOTAL | |
|-----------------------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|
| | # | Feet | # | Feet | # | Feet | # | Feet | # | Feet | # | Feet |
| Fence | | | | | | | | | 3 | 20,832 | 3 | 20,832 |
| Pipeline | 2 | 8,701 | | | | | 2 | 6,469 | 2 | 5,750 | 6 | 20,920 |
| Pumping Plant | | | | | 1 | | 1 | | 3 | | 5 | NA |
| Water Well | | | | | 1 | | 1 | | | | 2 | NA |
| Watering Facility | 2 | | | | | | 4 | | 5 | | 11 | NA |
| SUM (Σ) | 4 | NA | 0 | NA | 2 | NA | 8 | NA | 13 | NA | 27 | NA |

Table 8. 5 Year Trends in Location Specific Applied Conservation Practices. Reported in Feet if Linear (i.e. Fence)



Soil Resource Inventory ¹⁴

The Eastern Estancia Watershed has one certified National Cooperative Soil Survey (NCSS) inventory covering it, NM 674.



Figure 11. National Cooperative Soil Survey coverage of the Eastern Estancia Watershed



Soil Resource Inventory

In order to evaluate the susceptibility of erosion within the Eastern Estancia watershed, a model was developed using Soil Survey Geographic Database (SSURGO) information. The soil properties saturated hydraulic conductivity, soil loss tolerance, and wind erodibility group were used in conjunction with slope to assess soil mapunit potential for erosion. Saturated hydraulic conductivity and slope are reported in SSURGO databases as interval/ratio data whereas wind erodibility and soil loss tolerance are ordinal data. Data transformations for the model are listed -

| <u>SSURGO Value</u> | <u>Nominal Description</u> | <u>Model Rank</u> |
|---|----------------------------|-------------------|
| Saturated Hydraulic Conductivity | | |
| µm / s | | |
| 705.0 - 100.0 | Very High | 0 |
| 100.0 - 10.0 | High | 1 |
| 10.0 - 1.0 | Moderately High | 2 |
| 1.0 - 0.1 | Moderately Low | 3 |
| 0.1 - 0.01 | Low | 4 |
| Slope % | | |
| 0 - 5 | | 0 |
| 6 - 10 | | 1 |
| 11 - 15 | | 2 |
| 16 - 25 | | 3 |
| > 25 | | 4 |
| Soil Loss Tolerance | | |
| 5 | High Tolerance For loss | 0 |
| 4 | ↓ | 1 |
| 3 | ↓ | 2 |
| 2 | ↓ | 3 |
| 1 | Low Tolerance For Loss | 4 |
| Wind Erodibility Group | | |
| 1 | Very High | 4 |
| 2 | Very High | 4 |
| 3 | High | 3 |
| 4 | High | 3 |
| 4L | High | 3 |
| 5 | Moderate | 2 |
| 6 | Moderate | 2 |
| 7 | Moderate | 1 |
| 8 | Slight | 0 |

Table 9. Criteria Used for Soil Erosion Susceptibility Model.



Soil Resource Inventory

For each soil map unit (discrete delineation), the soil properties (named above) of the dominant soil type was used as the condition to be evaluated in the susceptibility to erosion model. Miscellaneous areas such as gravel pits, water, riverwash, etc. were excluded from evaluation. Possible range of values for each map unit are 0 – 16. Increasing values represent a higher susceptibility to soil erosion.

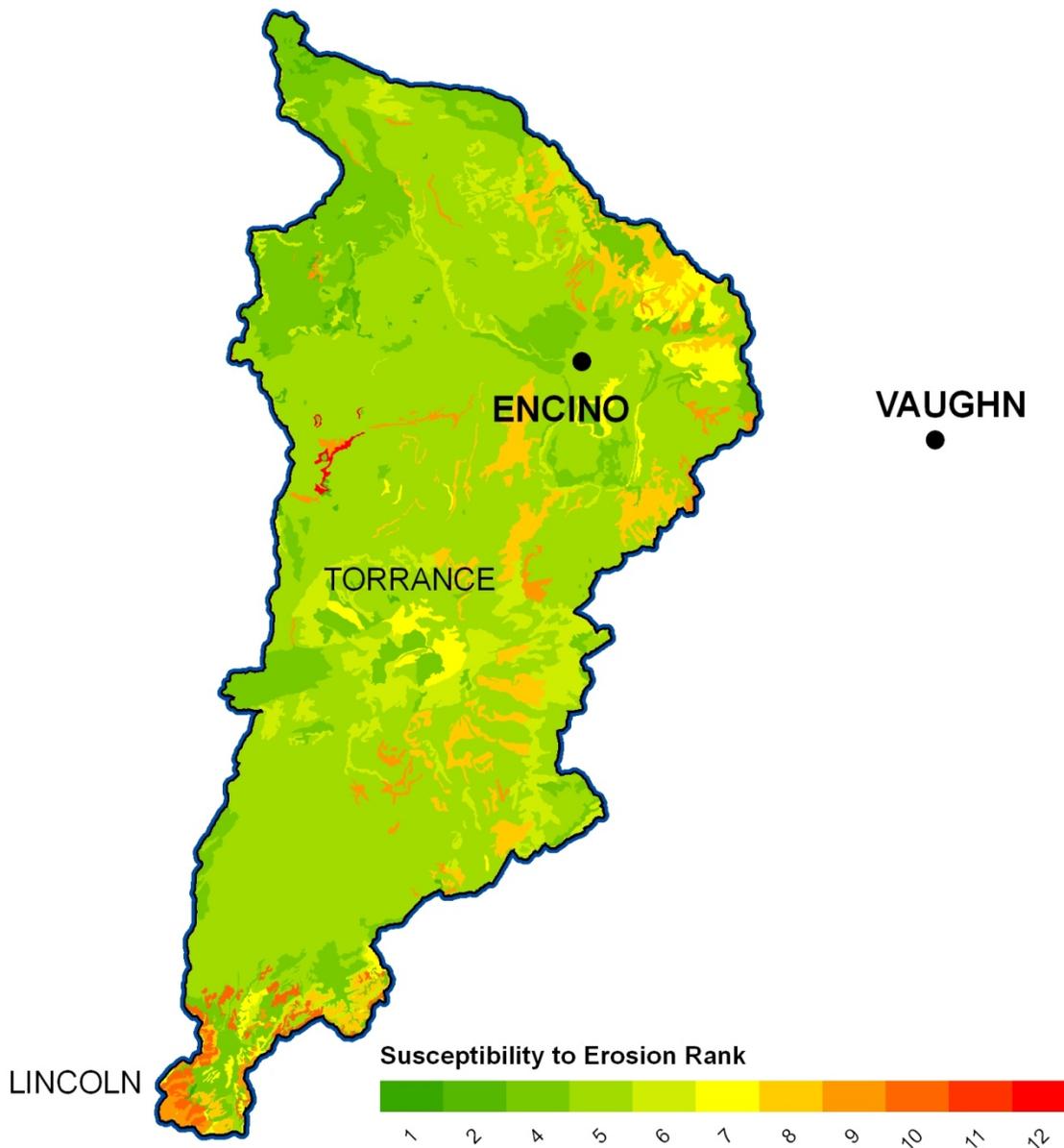
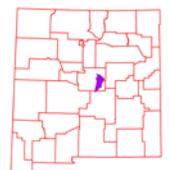


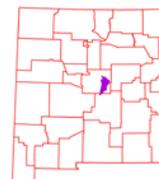
Figure 12. Eastern Estancia Watershed Erosion Potential



Soil Resource Inventory

| Rank | Acres |
|-----------------------------------|----------------|
| 1 | 47 |
| 2 | 2,027 |
| 4 | 52,100 |
| 5 | 205,749 |
| 6 | 28,177 |
| 7 | 10,125 |
| 8 | 21,437 |
| 9 | 6,071 |
| 10 | 2,976 |
| 12 | 467 |
| Sum(Σ) | 329,176 |

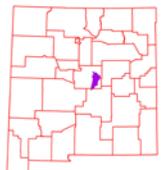
Table 10. Soil Erosion Potential Model Results. A greater rank indicates greater potential for erosion.



Socioeconomic Data ¹⁵

| COUNTY | Total population: Total | Total population: Urban | Total population: Rural | Total Pop.: Rural Farm | Total Pop.: Rural Nonfarm | Total population: Hispanic or Latino | Total population: White alone | Total population: Black or African American alone | Total population: American Indian and Alaska Native alone | Total population: Asian alone | Total population: Native Hawaiian and Other Pacific Islander alone | Total population: Some other race alone | Total population: Two or more races | Families: Median family income adj. 2009 |
|-----------------|-------------------------|-------------------------|-------------------------|------------------------|---------------------------|--------------------------------------|-------------------------------|---|---|-------------------------------|--|---|-------------------------------------|--|
| Lincoln | 20,497 | 7858 | 7440 | 116 | 7324 | 6,110 | 13,600 | 74 | 407 | 67 | 5 | 24 | 210 | 40,035 |
| Torrance | 16,383 | 323 | 6934 | 319 | 6615 | 6,399 | 9,173 | 172 | 274 | 61 | 7 | 24 | 273 | 34,461 |

Table 11. Socioeconomic Data of the Counties in the Watershed (2010) except for green cells, not available yet from 2010 census so are 2000.



References

1. Parameter-elevation Regressions on Independent Slopes Model (PRISM). PRISM is a unique knowledge-based system that uses point measurements of precipitation, temperature, and other climatic factors to produce continuous, digital grid estimates of monthly, yearly, and event-based climatic parameters. <http://www.prism.oregonstate.edu/>
2. Bureau of Land Management – New Mexico State Office. - http://www.blm.gov/nm/st/en/prog/more/geographic_sciences/spatial_data_metadata.html
3. UNITED STATES GEOLOGICAL SURVEY - National Land Cover Dataset. <http://landcover.United States Geological Survey.gov/>
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